Hanbury-Tenison tells us that, on his journey from the expedition base at Marudi to the site of the base-camp just outside Gunung Mulu National Park, he came across 'one of the largest machines I have ever seen, with a mighty mandible in the front' which could lift whole trees 'like matchsticks'.

Fortunately some Governments, especially that of Sarawak, are making determined attempts at conservation by setting up National Parks such as Gunung Mulu, and devising and implementing scientifically-based management plans. This is greatly to their credit, as timber is one of the main assets which their countries have, and which can be used to obtain foreign exchange. In the long term, no doubt, greater profit could be derived by harvesting selectively without total destruction; but this would not solve the current problems of Government. It is time that Governments of the advanced countries of the world took positive action to provide active assistance to Governments in the tropics in their efforts to conserve rain-forest.

The Gunung Mulu expedition ran for nearly two years (from early 1977 to late 1978). Nearly one hundred scientists, mainly specialists in various branches of geology, zoology, or botany, took part for varying periods. They were chosen on a basis of their fitness to carry out particular scientific tasks. Hanbury-Tenison says that this worked very well, and clearly he feels that professional dedication leads to better cooperation and mutual respect than any desire for excitement and adventure, though these elements were not lacking either. Scientifically the expedition was highly successful, and in this respect was probably among the best ever organized by the Royal Geographical Society. The biological data collected, and the ecological synthesis of them that was achieved, have provided a sound basis for the Management Plan of the National Park.

This book is the popular account of the expedition, and it is very readable and well illustrated, with 24 pages of black-and-white photographs. It reveals that this tropical forest is very varied, immensely rich in species, and truly fascinating. The first part of the book is an absorbing account of how an expedition of this kind is organized, and gets us as far as the base-camp. This was a traditional longhouse built from local materials and situated just outside the Park. When the expedition finally left, it was carefully dismantled and removed, leaving just a small clearing in the forest. Some much smaller camps for temporary occupation were built actually inside the Park.

The second and longer part of the book takes us right into the forest, up to the summit of Gunung Mulu, on to the limestone ridge with its fantastic rock pinnacles, deep into the limestone caves, and face to face as it were with the immense variety of plants and animals. We are told of the work of the scientists, and some of their results. The chapter entitled 'Forest ecology—how it all works' is particularly interesting. Hanbury-Tenison is very much concerned about the well-being of the local nomadic people, the Penan. They were hospitable and very helpful to the members of the expedition, and their subtle adjustment to their environment is impressive. But they and their environment are subject to pressure from without, and he discusses the problems currently facing them and their future prospects both sensitively and unsentimentally.

As well as a foreword by Lord Hunt, President of the Royal Geographical Society, there is an afterword by his predecessor, Lord Shackleton, who had been the first European to ascend Gunung Mulu in 1932. Both of them visited the expedition base-camp in 1978, and as well as placing the enterprise in its historical setting, they express sober concern for the future of the Penan and for that of the forest itself. Appendixes give lists of the birds and mammals recorded for the National Park. More detail is given about the limestone cave systems, which include the longest known passage cave in the world, in a Royal Geographical Society publication *Caves of Mulu*, by D. B. Brook & A. C. Waltham (1978). Persons interested in floristic lists and details of the vegetation, and faunal lists of animals other than birds and mammals, will, however, need to consult the expedition's scientific reports.

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Energy Future: Report of the Energy Project at the Harvard Business School, Edited by ROBERT STOBAUCH & DANIEL YERGIN. Random House, New York, NY 10022: x + 353 pp., 7 figs, 19 tables, 24 x 15.5 x 3 cm, US $12.95, 1979.

This is an unusually important book from many points of view. It is the result of a major effort by an energy team at the Harvard Business School to examine the issue of energy in the United States, to consider the various options for the rest of this century, and to put forward a specific plan of action. In essence, the goal of the team was to determine how best to make a transition from a world of cheap imported oil to a more balanced system of energy resources.

In the course of researching and writing this book, the principal authors held discussions with over three hundred business executives, government officials, labour union leaders, analysts, academics and other specialists; their co-authors had similar exchanges with many hundreds more. Thus the mode of analysis used in this book is a managerial one that assessed priority and potential, cost and risk, incentive, profit, and the marketplace.

On the basis of their in-depth analysis, the authors conclude that—for well-documented reasons of a technical, economic, environmental, or social nature—domestic sources of oil, gas, coal, and nuclear energy, cannot deliver vastly increased supplies. Thus, the two remaining options are (1) to import more oil, or (2) to accelerate the development of energy conservation and of solar and other 'alternative' sources of energy. Of these two alternatives, the authors opt very strongly for the second.

With regard to implementation of this option, the authors place reliance on the market-place. They stress, however, that if the market is to resolve the nation's energy problems, its distortions must be so corrected that all energy sources—including conservation and solar—will be able to compete on an equal economic footing. The more important of these distortions are then outlined, together with the steps which must be taken for their correction. Implementation of the authors' plan of action would lead to a more balanced energy-supply programme in the late 1980s than at present: oil imports would be held at their 1977 level, and conservation and solar energy would provide two-thirds of the 'increased' energy supplies (compared with only one-

quarter in the conventional programme, based on Department of Energy forecasts).

This challenging and controversial book has received wide attention; indeed, a synthesis of it was published in the prestigious journal 'Foreign Affairs'. In the opinion of the reviewer, the analysis presented and the conclusions reached are sound. The key issue is whether the corrective steps outlined by the authors will in fact be taken, so that market forces can, in an even-handed way, bring about the desired changes, resulting thereby in a more appropriate and balanced mix of energy sources than obtains at present.

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Agricultural Ecology, An Analysis of World Food Production Systems, by GEORGE W. COX & MICHAEL D. ATKINS. W. H. Freeman, 600 Market Street, San Francisco, California 94104: x + 721 pp., illustr., 24.2 x 18.8 x 3.2 cm, [no price indicated], 1979.

In their introduction, the Authors state that the unity of applied and theoretical ecology has 'been mistreated by the artificially branching growth of modern science'. It is their declared aim to present a textbook on agricultural production in which farming systems and their components—traditional and modern—are analyzed in the light of their ecological implications.

In this they have succeeded admirably. Avoiding the dogmatism of those who ascribe all manner of ecological disasters to the use of modern inputs of agriculture, the Authors have adopted a balanced point of view. They do not militate against modern practices that *may* result in the deterioration of natural resources, but stress instead the dangers involved in improper use of these inputs. They then propose agricultural technologies that are ecologically sound but do not sacrifice productivity.

Agricultural production is a vast and complex subject. The Authors have therefore wisely decided to treat the most important fundamentals, and to provide the background information that will make the individual reader aware of the problems involved in achieving a high level of productivity without causing irreversible damage to the environment.

The book is divided into three parts, devoted respectively to 'The Ecological and Historical Context of Agriculture', 'The Dynamics of Agro-ecosystems', and 'Agriculture and the Future'.

Part one analyzes the ecological fitness of past and present agricultural systems. The Authors first examine the world food balance and the available resources, and conclude that growth in food production must be achieved through increased yields per unit area—but always in the framework of ecologically sound farming systems.

In their analysis of subsistence agriculture, the Authors tend to overestimate 'the intrinsic ecological rationales' and the 'high levels of crop productivity' of traditional farming systems. However, to state that 'people of long-standing pastoralist societies may display a high level of ecological awareness' does not accord well with the rapid spread of desertification which we are witnessing!

Two of the major traditional agricultural systems—pastoralism and shifting cultivation—have been able to maintain themselves for untold generations, not as a result of 'ecological awareness', but because the impact of a small population on an enormous land-potential was negligible. However, as soon as population pressures increase beyond a critical point, both these systems break down—generally with disastrous and irreversible results. As for the civilizations that were based on irrigation agriculture, their breakdown within relatively short periods was almost inevitable, because of the inability of the traditional farmer to cope with the twin problems of salt accumulation and rising water-tables.

The examples given of high levels of productivity in traditional systems are somewhat misleading. Thus it is stated that the yields obtained in Nabatean floodwater farming in the Negev were higher than those of modern agriculture in the moister northern Negev. Actually, the comparison is not between a traditional and a modern farming system, but between crop production with an assured water-supply equivalent to 400–500 mm (through flooding), and rainfed production in an area of 200–300 mm. Under the latter conditions of aridity, modern inputs such as high-yielding varieties and fertilizers, are irrelevant. The mention of the high levels of productivity achieved in shifting agriculture, due to the 'abundant mineral bases provided by ash resulting from burning the forest vegetation' (p. 290), is in contradiction to the statement that 'low productivity is a fairly common disadvantage of this (shifting cultivation) system of farming' (p. 393). It is the latter statement which is correct.

In part two of the book, the major natural resources: climate, land, and water, and their interrelationships with agricultural production, are described. Other chapters are concerned with the impacts of cultivation, grazing, irrigation, fertilization, and plant protection methods. Amongst the problems discussed are: the possibility of the world entering a period of greater climatic variability and the resultant possible decline in agricultural production; the effects of modern methods of cultivation on soil structure; the problems of supply and cost of irrigation and fertilizer-use, together with their impacts upon the agro-ecosystems and their side-effects outside of agricultural areas; the common deterioration of agricultural soils and means of preventing it; and the nature of agricultural pest problems and the potentials and dangers inherent in various methods of control.

In part three, entitled 'Agriculture and the Future', a variety of topics are presented: world germ-plasm resources and plant breeding; production in aquatic systems; energy costs of biological production; the future of agriculture in developed and in developing countries; and international agricultural policy.

Particular attention is given to the economic and sociological implications of intensifying agriculture in the (more or less) developing countries. The Authors stress that the heavy dependence of mechanized agriculture on fossil fuels makes it vulnerable to price and supply manipulations; hence the need 'for careful analysis of alternative practices that might maintain high productivity at lower costs of fossil fuels'. This can be achieved mainly by 'increasing the efficiency with which resources are used'. In the developing countries the objectives should be to increase investments in rural development by national and international efforts, to emphasize labour-intensive techniques that do not displace labour, and to adopt intermediate technology.